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Design and Build Instruction Details for my MPCNC

I want to document some of the details of how I built my MPCNC, in case anyone might want to use some of my ideas to build their own version. I live in a small apartment and my machine is designed to be able to roll under my workbench. It is a small footprint and is built low to the ground. I will also be adding a guarding package to the machine to control dust and noise while using the machine. I will be using aluminum extrusion to build the guarding and will document this later in the project. A quite large project like this requires some planning upfront and I made decisions and compromises and hope to document my results and additional information later. Here is a copy of the cut calculator for the tubing required for the project. This calculator can be found on the Vicious 1 website located at: <https://www.vicious1.com>. The actual working size of the machine is just short of 12" x 18".

Cut Calculator for the MPCNC (in)

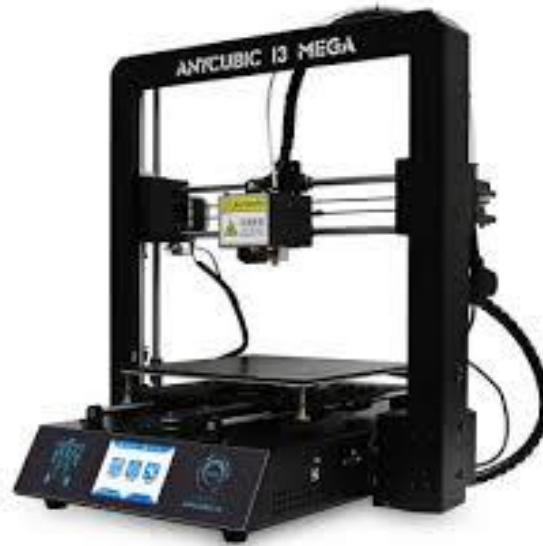
Cut calculator for the Mostly Printed CNC 525 (MPCNC)
found at <http://www.vicious1.com/>

Share current values:

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Inputs	Outputs
X-Axis Desired Work Width: 11.85	3x X-axis Conduit Lengths: 22.25
Y-Axis Desired Work Depth: 17.85	3x Y-axis Conduit Lengths: 28.25
Z-Axis Desired Work Height: 3	2x Z-Rail Lengths: 10.5
	4x Leg Conduit Lengths: 2.5
	1x Allthread/Leadscrew length (minimum): 6
	Minimum Table Width (X-axis): 22.5
	Minimum Table Depth (Y-axis): 28.5
	2x - X-axis Belt Length (minimum): 27.85
	2x - Y-axis Belt Length (minimum): 33.85

Since I will eventually be designing my own machine, much of my work is a great way to learn more about CNC and the associated electronics and mechanics required. My work life has been part machinist and part Mechanical Design Engineer. So, I have an extensive background already in many of these areas. I have built two 3D Printers as part of this process. All the parts for the MPCNC have been made with my second printer which is an Anycubic I3 Mega. It is a nice unit and works very well.



Here is a picture of most of the Printed Parts. The new foot design came out after this picture was taken and I have incorporated it into the design. I built all the parts for the 23.5 MM design.



3D Printing is very similar to the operation of a CNC router. But there are some unique differences. There is a lot to learn about materials, machine settings and the design of parts for printing. I liked the idea of doing most of the fabrication on my CNC myself. Most of us don't have a machine shop at home and that makes building a router from scratch an expensive proposition. I took somewhere around 200 hours to print all the parts for my machine. PLA is strong and easy to print. I was very pleased with the design of the parts and the ease of assembly it has afforded me. I printed all the parts before starting any assembly.

Below is a picture of the EMT conduit all cut to size. I built the 23.5 mm version. Make sure that you buy a tubing cutter to cut all the tubing to size. It made the job much easier and more accurate. The cost was under 15 dollars for the one that I bought, and it worked well.



I purchased a component kit from V1 engineering for my machine. I was amazed that I received the shipment in a day and a half, even though I ordered on the weekend. Amazing service is all I can say. It is the mostly printed CNC parts bundle with a 6V power adapter and the Mini-Rambo Board. I also bought a full graphic smart controller (LCD). I purchased a 500-watt Spindle on eBay along with a set of collets for the spindle. I wanted a quieter option for running this machine as I live in a small apartment. The guarding Installation

should also minimize any noise. This is most of the parts needed to finish the machine. I continue to work on finishing assembly and will then move to the wiring phase of the project.



I purchased a small roller cabinet for mounting of my machine. It is a mobile under desk machine stand meant for holding a printer underneath your desk. I purchased this on Amazon for 58.00 dollars. It has a tray underneath that I will use to mount the electronics and accessories for the unit. It is 21" x 17" and is 11" high. I purposely bought this height, so my machine will store underneath my workbench when not in use. Notice it also has rollers with 2 of them locking.



Next, I mounted the machine base to the roller cabinet with 5 1/4-20 screws. The base is 3/4-inch Birch plywood 24" x 30" size. I put on 4 coats of clear Poly Acrylic. This is a water-based product that is less toxic smelling than some of the other types. Eventually there will be a replaceable cutting/waste board mounted on top of this. The height to the top of the plywood is just under 12 inches. You can see from the picture the space that the machine is meant to fit into under my workbench. This is pretty much wasted space except for storage and will be reclaimed for the machine to live out of the way of other normal functions. The workbench will still be fully functional.



A good portion of the assembly is completed, and I have mounted the unit to the plywood with number 6 wood screws. You can envision the guarding package which will be mounted around the outside of the plywood base, completely enclosing the machine inside of it. The plan is to use 15 mm extrusion with clear acrylic panels all the way around. A top will also be included. I may or may not add a ventilation system to the unit. The initial plan is to build a router and maybe add a Laser cutter later. This is where ventilation will become important. I am currently in the design phase of the guarding package. I am using my skills as a Cad Designer to work up these details in cad. I will need to add some access holes for wiring to get the electronics to the bottom shelf. The roller cabinet has gripping holes that will be perfect to run the wiring through. The

bottom tray is open and will aid in air movement to keep the electronics ventilated. I may print a PLA tray on my 3D Printer to mount the electronics in.



These are the details that are completed for now. I will be updating this build and design instruction as I go. I will update it on the website as progress is made. Check back as this document will be updated regularly. I invite your comments and thoughts as I move ahead on this project. I am having fun and look forward too many more hours of learning and productive work once the project is finished. As an engineer owned company we are already in the planning and designing phase for a newly designed CNC router product. We hope to offer a lot of features that no other unit on the market offers. We may offer this as a plan, kit or a book detailing construction. We hope to eventually incorporate parts for this product into our store. This machine will be used for making aluminum parts for the new platform and for engraving of signs which will eventually be available in our store. Please leave your comments on the website or send me an e-mail at michael@mrtechnotrout.com.

Plan to visit the website at <http://mrtechnotrout.com>. Leave a comment or send me an e-mail. We hope to add all kinds of relevant router information as well as Maker/DIY information that we hope is informative and useful. This is all under development as we speak.